

What Are Dominant and Recessive Traits?

Patterns of Inheritance

What traits have you inherited? Every living thing is a collection of traits that have been passed down to them by their parents. These traits are controlled by something called **genes**. Genes are made up of DNA and are located on the chromosomes. When pairs of chromosomes separate into sex cells during a process called meiosis, pairs of genes also separate from one another. As a result, each sex cell winds up with one form of a gene for each trait the organism shows. If the trait is for hairlines, then the gene in one sex cell may control one form of the trait, such as common baldness—an “m-shaped” hairline. The gene for hairlines in the other sex cell may control another form of the trait, such as a straight hairline. The different forms a gene may have for a trait are called **alleles** (uh LEELZ). An allele is one pair of genes that can appear as alternatives in heredity, and they are located on equivalent portions of chromosomes. Most cells in our bodies have two alleles for every trait.

Two Genes for the Trait Determine Inheritance

Gregor Mendel, the father of genetics who studied the inherited traits of pea plants, noticed that **genes** (hereditary factors) always came in pairs. Every organism that reproduces sexually receives two genes for each trait; they receive one gene from each parent. Mendel noticed, however, that the genes were not always equal. He wondered why some traits found in the parents showed up in their offspring, while other traits did not. To find the answer, he experimented with pea plants. These experiments led to the principal of genetics called the **Law of Dominance**.

The **Law of Dominance** states:

- An organism receives two genes for each trait, one from each parent.
- One of the genes may be stronger; the trait of the stronger gene shows up and is called the dominant gene. The trait of the weaker gene is “hidden” or does not show up and is called the recessive gene.

The trait that was always visible in the offspring was considered to be the stronger of the two. If the trait always showed up in the offspring, he called that gene the **dominant gene** for that particular trait. The other gene, weaker and usually hidden by the stronger gene, was called the **recessive gene** for that trait. If an offspring receives two of the same genes (either two dominant genes or two recessive genes), the offspring will inherit or have that trait. There are no other possibilities. An organism with two alleles for a trait that are exactly the same is called **homozygous** (HO muh ZI gus). An organism with two different alleles for a trait is called **heterozygous** (HET uh roh ZI gus).

Pure Traits

Pure traits can be either recessive or dominant. **Pure traits** may have two dominant genes or two recessive genes. For example, a pea plant may have two genes for tallness, which is a dominant trait in pea plants. This plant is a homozygous plant with a pure dominant trait for tallness. All of the offspring from this plant will be tall. A pea plant with two genes for shortness is also a pure organism. However, shortness in pea plants is a recessive trait. This

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plant is a homozygous plant with a pure recessive trait for height. The offspring from this plant will be short if it pollinates with another plant that has two genes for shortness. If this plant pollinates with a tall pea plant, the tall dominant gene will mask or cover up the recessive gene for shortness. Both plants are homozygous or pure plants; one is a pure dominant pea plant, the other is a pure recessive pea plant.

Hybrid Traits

Organisms that have two unlike genes for a certain trait are called **hybrid**. A pea plant with one recessive gene for shortness and one dominant gene for tallness is a hybrid for that trait. A hybrid is called heterozygous, as it has two different alleles. The offspring from a pure tall pea plant, cross-pollinated with a pure short pea plant, will result in a heterozygous plant for tallness. No organism has all dominant or all recessive genes. An organism may be pure in certain traits and hybrid in others. Remember, student observers, that a dominant trait in one kind of organism may be a recessive trait in another organism.

Homozygous Traits

Dominant Trait


PURE TALL

T

Gene from female

T

Gene from male



Recessive Trait

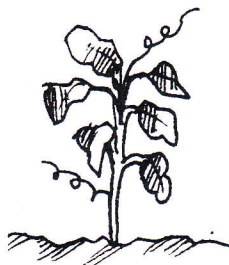
PURE SHORT

t

Gene from female

t

Gene from male



Heterozygous Traits

Hybrid Trait

HYBRID TALL

T

Gene from female

t

Gene from male

